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Claim Listing

1–19. (cancelled)

20. (new) A method for coating a surface of a continuous paper or board web formed of papermaking fibers, with a dry coating powder, the method comprising the steps of:

moving the continuous paper or board web between electrodes which are at different electrical potentials;

applying the dry coating powder on to a first surface of the continuous paper or board web by utilizing the difference in the electric potential, wherein the dry coating powder is formed from 70–99% inorganic material having an average particle size of 0.1 –500 μm, and wherein the dry coating powder is comprised of 1–30% polymeric binder material; and

finishing the dry coating powder on the surface of the paper or board web.

21. (new) The method of claim 20, wherein the the dry coating powder is formed from 80–95% inorganic material.

22. (new) The method of claim 20, wherein the the dry coating powder is formed by freeze-drying.

23. (new) The method of claim 20 wherein the the dry coating powder has an average particle size of 1–15 micrometers.

24. (new) The method of claim 20 wherein the continuous paper or board web is caused to travel at a speed of 1,200 to 2,500 m/min.

25. (new) The method of claim 20 wherein the polymeric binder material has a glass transition temperature of 20° C to about 100° C.

26. (new) The method of claim 20 wherein the dry coating powder has a moisture content of less than 15%.

27. (new) The method of claim 20 further comprising the step of pre-charging the dry coating powder.

28. (new) The method of claim 20 wherein the step of finishing further comprises simultaneously adhering and smoothing the dry coating powder to form a first coated surface of the web, by passing the web through a nip formed by a hot hard roll and a moving earthing member and subjecting the dry coating powder on the web to a temperature of 80–350°C, a linear nip load of 25–450 kN/m and a nip dwell time of 0.1–100 ms.

29. (new) The method of claim 28, further comprising the step of, after finishing the dry coating by simultaneously adhering and smoothing the dry coating powder to form the first coated surface of the web, treating the first coated surface at least in a nip formed between a heated roll and a resilient roll.

30. (new) The method of claim 28 further comprising the step of, after finishing the dry coating by simultaneously adhering and smoothing the dry coating powder to form the first coated surface of the web, treating the first coated surface in a substantially long nip formed between two counter surfaces.

31. (new) A method for coating a surface of a continuous paper or board web formed of papermaking fibers with a dry coating powder, the method comprising the steps of:

forming the dry coating powder from 70–99% inorganic material having an average particle size of 0.1 –500 μm and a polymeric binder material forming 1–30% of the dry coating powder;

preparing a first surface of the paper or board web to receive the dry coating powder by a process which changes the surface properties of the paper or board web;

transporting the dry coating powder as a more than 1% by volume mixture with air;

allowing the web to move between electrodes, which are at different potentials;

spraying the dry coating powder through an electric field and a free-ion concentration to the surface of the paper or board web which has been prepared to receive the dry coating powder, said spraying taking place along the direction of the strong electric field, while the paper or board web is backed by a moving earthing device; and

finishing the dry coating powder by simultaneously adhering and smoothing the dry coating powder to form a first coated surface of the web, by passing the web through a nip formed by a hot hard roll and the moving earthing member, and subjecting the dry coating powder on the web to a temperature of 80–350°C, a linear nip load of 25–450 kN/m and a nip dwell time of 0.1–100 ms.

32. (new) The method of claim 31, wherein the the dry coating powder is formed from 80–95% inorganic material.

33. (new) The method of claim 31 wherein the the dry coating powder has an average particle size of 1–15 micrometers.

34. (new) The method of claim 31, wherein the the dry coating powder is formed by freeze-drying.

35. (new) The method of claim 31, wherein the continuous paper or board web is caused to travel at a speed of 1,200 to 2,500 m/min.

36. (new) The method of claim 31, wherein, the organic material has a glass transition temperature of 20° C to about100° C.

37. (new) The method of claim 31, wherein the dry coating powder has a moisture content of less than 15%.

38. (new) The method of claim 31, further comprising the step of pre-charging the dry coating powder.

39. (new) The method of claim 31, further comprising the step of, after finishing the dry coating by simultaneously adhering and smoothing the first coated surface of the web, treating the first coated surface at least in a nip formed between a heated roll and a resilient roll.

40. (new) The method of claim 31 further comprising the step of, after finishing the dry coating by simultaneously adhering and smoothing the dry coating powder to form a first coated surface of the web, treating the first coated surface in a substantially long nip formed between two counter surfaces.

41. (new) The method of claim 31 wherein the first side and a second side of the web are coated simultaneously.

42. (new) The method of claim 31 wherein the first side and a second side of the web are coated sequentially.

43. (new) The method of claim 31 wherein at least one additional layer is formed on the first coated surface by a dry surface treatment process.

44. (new) A dry surface treated sheet material comprising:
a substrate, the fibrous portion of which consists of papermaking fibers; and
a coating layer on the substrate, wherein the coating layer comprises 70–99 wt. % of inorganic material, and 1–30% polymeric binder material.

45. (new) The dry surface treated sheet material of claim 31, wherein the coating layer comprises 80– 95 wt.% of inorganic material.

46. (new) A dry-coating powder comprising a mixture containing 70–95% inorganic material having an average particle size of 1–15 micrometers, the mixture including a polymeric binder material forming 5–30% of the dry-coating powder.

47. (new) The dry-coating powder of claim 45 wherein the mixture contains 80–95% inorganic material